VIGILANTE FORENSIC

Human Factors | Ergonomics Consulting

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Case Caption:	Joseph & Ursy A. Vitale Vs. Electrolux Home Products, Inc.
VF Case Number:	15-009
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A. INTRODUCTION

At 6:15 PM, on Thursday September 4, 2014, a fire was reported at the single family home of Joseph and Ursy Vitale, 1812 Purdie Lane, Maple Glen, Montgomery County, PA. The fire originated within the cabinet of a General Electric (GE) natural gas clothes dryer. The fire was caused by an ignition of lint buildup within the dryer near the heat source. The dryer was manufactured by Electrolux Home Products, Inc. (Electrolux). Electrolux has claimed that the dryer was improperly installed and/or maintained.

The purpose of my investigation was to determine if:

1. The warnings provided with the dryer were defective in a manner which caused the fire;
2. Electrolux's actions were unreasonable and a cause of the fire; and
3. The Vitale's actions were foreseeable to Electrolux.

I have included an updated CV outlining my qualifications and a listing of my testimonies for the past four years within the Appendix section of this report. Vigilante Forensic currently invoices my work associated with this investigation at a rate of $335.00 per hour.

I may use the following materials as exhibits to illustrate my testimony: photos taken of the incident dryer; instructional material and manuals provided by GE and/or Electrolux; examples of on-product warnings and indicator lights used on other types of products; example on-product warnings and indicator lights for the dryer as described in Section E-3 of this report, and the references and standards cited within this report.

B. AVAILABLE MATERIAL

- Complaint
- Upper Dublin Township Department of Fire Services Fire Incident Report
- Fort Washington Fire Company Report
- Upper Dublin Township Police Department Incident Report
- PA State Police Fire Report
- Electrolux's:
    - Answer to Plaintiff's Complaint with Affirmative Defenses
    - Rule 26(a)(1) Initial Disclosures
    - Responses to Plaintiff's First and Second Sets of Request for Production of Documents
    - Dryer door warning (EHP-Vitale 000051)
    - Mobile home install label (EPH-Vitale 000049)
    - Back of dryer label (EHP-Vitale 000050)
    - GE Dryers Owner's Manual and Installation Instructions (EHP-Vitale 000022 to 000045)

  - Dryer Operating Checklist (EHP-Vitale 000048)
  - Annual Demand Flexible Foil (Bates No. EHP_SF0062148)
  - Driver Service Instructions (Bates No. EHP-Vitale 000046 to 000047
- Deposition transcripts and exhibits of:
  - Carl King, dated 12/17/2015
  - Joseph A. Vitale, dated 12/23/2015
  - Ursy A. Vitale, dated 12/23/2015
- Equinox Insurance Company's General and Products Liability Employment Practices Liability Documents: (Bates No. EHP-Vitale 000052 to 000054)
- State Farm Discovery Documents, Bates No. EHP_SF 0029114 to 0151488; 0151493 to 0180175; 0180177 to 0201117; 0201119 to 0255601
- Prior deposition transcripts and exhibits of:
  - Brian Ripley, dated:
    - 7/18/2013 in the Marquette matter
    - 6/1/2012 in the Harotounyan/State Farm matter
    - 10/25/2011 in the Power matter
    - 6/22/2011 in the Gargiulo matter
  - Carl D. King, dated:
    - 10/23/2015 in the Shannon matter
    - 10/22/2015 in the Cloud matter
    - 7/2/2014 in the Gianferri matter
    - 7/18/2013 in the Marquette matter
    - 9/16/2011 in the Power matter
    - 5/20/2010 in the Tirrell matter
  - Michael Ricklefs, dated
    - 4/23/2014 in the Gianferri matter
    - 6/23/2011 in the Gargiulo matter
  - David Fuller, dated 1/13/2016, in the Cloud matter
  - Shelley Clausen, dated 2/5/2014 in the State Farm Consolidated matter
  - Steve Joerger, dated 2/11/2014 in the State Farm Consolidated matter
- Trial testimony transcript of Carl D. King, dated 2/24/2010 in Standard Fire Insurance matter
- Digital copies of site and inspection photographs
- Teleconferences with Michael Stoddard on 1/27/2016
- Reports of:
  - A. John Fry, dated 2/26/2016
  - Michael Stoddard, dated 2/26/2016

C. PRODUCT DESCRIPTION

The fire involves a General Electric (GE) free standing, front-loading, natural gas clothes dryer manufactured by Electrolux Home Products, Inc. (Electrolux). The dryer was manufactured in July 2004 (date code G MD). The dryer was included in the sale of the home when purchased by the Vitales.

The dryer drum is accessed from a side hinged front door. Controls for the dryer are located along the back edge of the top of the dryer cabinet. A four inch diameter exhaust vent is located at the bottom rear of the dryer. An electrical cord is connected to the rear of the cabinet. A gas connection is also located in the rear of the cabinet.

There are typically three components to the dryer's exhaust system (CDK 9/16/2011: 40-42):

- The dryer exhaust located within the dryer cabinet exiting the back of the dryer;
- The permanent house duct that goes from the outside of the home to the wall/floor opening near the dryer; and
- The transition duct that goes from dryer exhaust to the permanent house duct.

The dryer is manufactured with a warning label and a model/serial number label affixed to the inside door frame of the drum opening (BR 10/25/2011: 52,57,91,92; CDK 9/16/2011: 17-22; CKD 1/17/14: 84). A label regarding the installation of the dryer in pre-manufactured homes is also affixed to the inside door frame of the drum opening. A label is also adhered to the back of the dryer (CKD 1/17/14: 84).

The warning label on the inside door frame states, along with other topics:

- Clean lint screen before or after each load.
- Caution: A clothes dryer produces combustible lint and must be exhausted outdoors. Care should be taken to prevent the accumulation of lint around the exhaust opening and in the surrounding area.

The majority of the label text is printed in black text on a white background. However, the signal word "Warning," the words "DO NOT," and the statement "Have a question about your appliance? Contact us at www.GEAppliances.com or 800.626.2000" are printed in white text on a black background.

The model/serial number label typically provides the manufacture date of the dryer; manufacturer address information; electrical and gas specifications for the dryer; and notes that the dryer is ANSI Z21.5.1 compliant. The label is typically printed in black text on a silver/white background. The pre-manufactured housing label is also printed with black text on a white label with a black border.

The warning label on the back of the dryer is also printed in black text on a white background. The label on the back of the dryer provides information related to the ventilation requirements of the dryer installation location along with the following caution:

> A clothes dryer produces combustible lint. Exhaust outdoors. See Installation/Instruction manuals.

Electrolux claims the dryer was shipped with a 24 page "Owner's Manual and Installation Instructions" manual and a dryer performance checklist. Typically the manual is placed within the drum of the dryer at the factory (CDK 9/16/2011: 32,33). Electrolux claims the checklist is taped to the top of the dryer at the factory (BR 10/25/2011: 85; CDK 1/17/14: 84). The checklist is intended to be removed during the installation of the dryer.

D. BACKGROUND AND INCIDENT DESCRIPTION

Joseph and Ursy Vitale and their three children live in a single family, two story home located at 1812 Purdie Lane, Maple Glen, PA (UV, 7,9). The home was built in 1962[1]. The Vitale's purchased the home and moved into the home in June 2010 (UV, 7,9). A laundry room is located on the first floor of the home off of the kitchen (UV, 11).

A washer, dryer, and utility sink are located in the laundry room (UV, 13,14). The washing machine is located between the utility sink to its right and the dryer to its left (facing the front of the appliances) (UV, 13-15). The wall behind the dryer is an exterior wall (UV, 14,15). There were no shelves above the dryer and the Vitales did not store anything around the dryer (UV, 15,16).

The Vitales did not purchase the incident GE dryer (UV, 17). The dryer was included in the purchase of the home and installed before the Vitales moved into the home (UV, 17). The Vitale never changed the location of the dryer (UV, 18). The Vitales were not provide with any manuals, checklist, or literature regarding the dryer when they purchased the home (UV, 18,26-28,41; JV, 16). Ursy Vitale testified that she does not recall discussing the dryer at any time during the purchase of the home (UV, 17). Ursy testified that they do not know how old the dryer was (UV, 17).

The dryer exhaust exited the home right behind the dryer (JV, 8). The dryer was connected to a GE branded flexible foil transition duct (JV, 7). The flexible foil transition duct was attached to a rigid metal duct that was mounted in the exterior wall of the home (JV, 8). The rigid metal permanent house duct was connected to a low profile single damper vent hood (JV, 9). Joseph Vitale had replaced the rigid metal house/duct hood unit about a year before the fire (JV, 10-12). Joseph purchased the duct/hood unit from a Lowe's home improvement store (JV, 10,11).

[1] Upper Dublin Township Fire Incident Report.

Joseph purchased the duct/hood unit as an upgrade to the wall duct/hood (JV, 10-12,14,15). The Vitales had made no other changes to the dryer's exhaust system (JV, 12).

Joseph Vitale testified that he moved the dryer from the wall at least once a year to disconnect the duct work, clean it, and make sure the transition duct was in good shape (JV, 8,15). Joseph would clean behind the dryer when he moved it out from the wall (JV, 11). Joseph would also check to ensure the flexible foil transition duct was not leaking any air after re-attaching it to the dryer (JV, 15). Joseph only used the dryer once a year when he was cleaning the ducting (JV, 16).

Ursy Vitale was the primary user of the dryer and used the dryer once or twice a day (UV, 17,18). Ursy testified that she never moved the dryer from the wall and never looked at the back of the dryer (UV, 25,30). Ursy also testified that she did not know anything about the dryer ducting (UV, 16,17). Ursy testified that she would clean the lint screen before each load and that occasionally she would clean the interior of the dryer drum and the top of the dryer cabinet (UV, 20-22,24). Ursy would also sweep and use a dust-buster to clean up any visible dust around the dryer (UV, 24,25)

The Vitales never had any kind of service technician come out to service, repair, or clean the dryer or dryer exhaust (JV, 16; UV, 25). The Vitales were not experiencing any problems with the dryer prior to the fire (JV, 15,16; UV, 20). Ursy Vitale testified that she was not aware that lint could build up within the dryer near the heat source creating a fire hazard (UV, 41). Ursy also testified that she was not aware that Electrolux recommended that the dryer should be completely disassembled and lint cleaned out by a qualified technician (UV, 41).

At about 6:15 PM on September 4, 2014, Ursy was using the dryer to dry a load of laundry while cooking diner (UV, 30,31). While she was in the kitchen, Ursy smelled smoke (UV, 31,32). Ursy went into the laundry room check to see where the smoke was coming from (UV, 31,32). Ursy saw smoke upon entering the laundry room (UV, 31,32). Ursy opened the dryer door and saw smoke coming out from the dryer (UV, 31-33). Ursy saw flames in the dryer as started moving the contents around inside the drum (UV, 32,33). Ursy called 911 to report the fire and evacuated the house with her children (UV, 32,33).

Fire Marshal Timothy Schuck investigated the fire for the Upper Dublin Township Department of Fire Services. In his Fire Incident Report, Fire Marshal Schuck noted:

> The fire patterns on the dryer indicated that there was a low fire below the drum with fire damage extending up through the drum to the top of the unit.

Based upon his investigation, Fire Marshal Schuck concluded the area of fire origin was determined to be located in the natural gas laundry dryer. A. John Fry, plaintiff's fire origin and cause expert, concluded in his February 26, 2016 report that the fire originated within the dryer cabinet of the GE branded gas clothes dryer. Fry also noted in his report:

> The flexible aluminum ventilation hose and the wall mounted vent hood did not exhibit any appreciable fire damage and there was no indication of a blockage in the exterior exhaust duct work that would have impeded air discharge from the dryer's exhaust vent.

In his February 26, 2016 report, Michael Stoddard, plaintiff's fire and dryer expert, concluded

> Our investigation revealed that the fire originated within the Electrolux dryer manufactured using what Electrolux refers to as the "Ball-Hitch" design. The ignition source was the flame and/or hot gasses produced by the gas fired burner. The first fuel ignited was lint collected within the heater pan mounted to the rear wall of the dryer cabinet, located directly behind the drum. The ignition event was the direct result of the first fuel (lint) coming into contact with a competent heat source (flame/gasses from the gas burner). The lint ignited in the area between the burner and rear of the drum was carried through the dryer drum and ignited additional lint that was collected in the area of the lint trap duct assembly to the front of the drum. ...
> This fire event occurred because the defective design of the subject Electrolux dryer. The Electrolux Ball-Hitch design dryer allows lint to collect behind the dryer's drum in direct proximity to the heat source where it is neither visible nor accessible by the user and allows for the lint to be ignited. The design is also defective because of its failure to confine the fire within the appliance, as the use of plastic components assists in communicating fire out of the appliance where it can ignite surrounding combustibles.

E. ANALYSIS

E.1. Electrolux Failed to Provide Adequate Warning.

The fire originated within a GE gas clothes dryer manufactured by Electrolux. The fire was caused by an ignition of lint buildup within the dryer. The dryer is part of Electrolux's Alliance series of dryers. Electrolux introduced their Alliance series dryers in the 1996/1997 time frame. Electrolux's Alliance series dryers utilize a ball-hitch design where the drum is attached to a spindle with a steel ball on the end that sits and rotates within a hard plastic saddle (i.e., bearing block) (CDK 7/2/14: 11,12,15). In their gas dryers, the burner is located under and behind the drum.

In their Answer, Electrolux claims that the fire and resulting property damage was due to the improper installation (i.e., the use of flexible foil transition duct) and/or maintenance of the dryer (i.e., no 18 month cleaning of the dryer interior or ducting). Electrolux also claims that the incident dryer "..., and was accompanied by all appropriate, necessary and required warnings and instructions."

Contrary to their claim, Electrolux failed to provide adequate warning and instruction regarding the lint fire hazard associated with the design of their dryer and the need to have the interior of the dryer and ducting cleaned (i.e., maintained) by an authorized service technician every 18

months to prevent a lint fire. Electrolux also failed to take reasonable steps to assess and identify the failure of their warnings and protect product users from an unreasonable risk of fire created by the design of their ball-hitch dryer. Electrolux's failure to provide adequate warning, assess and identify the failure of their warnings, and to adequately protect product users from the unreasonable risk of fire created by the design of their dryer caused the fire.

Carl King was a Product Safety manager at Electrolux and had personally investigated 600 dryer fires from 2006 to the 2013 (CDK 10/23/15: 328,329). Carl King, as Electrolux's corporate designee, testified that (CDK, 10/23/15: 104-106,168):

- A dryer fire can cause a catastrophic event;
- Fire is the most frequent hazard that Electrolux is aware of stemming from the use of their ball-hitch dryers;
- Fire is the most common liability claim that Electrolux investigates with respect to their ball-hitch dryers;
- He is not aware of any warranty claim with their ball-hitch dryers that results in a hazard as dangerous as fire; and
- The greatest hazard associated with the use of an Electrolux ball-hitch dryer is fire.

Lint is a byproduct of washing and drying fabrics. Electrolux was aware that during normal dryer use, even when installed per their instructions, lint will accumulate within the dryer and exhaust system (CDK 9/16/2011: 188; CDK 5/20/2010: 73; BR 10/25/2011: 74; MR 6/23/11: 112). Electrolux was also aware that installers used flexible-foil ducting to vent the dryer instead of rigid or semi-rigid metal ducting (24; CDK 9/16/2011: 42). For example, both Electrolux and GE sold flexible foil ducting for use in dryer installations in 2004[2].

However, Electrolux recommends against the use of flexible foil ducting because it can be easily crushed, kinked, or otherwise damaged restricting the amount of airflow through the dryer exhaust. Electrolux was aware that if the dryer's exhaust system was restricted, significantly more lint will accumulate within the dryer cabinet and temperatures within the dryer will increase (BR 10/25/2011: 98,99; CDK 9/16/2011: 50,59,61; CKD 5/20/2010: 90,129,130; CDK 7/18/13: 48,49; CDK 7/2/14: 58). Electrolux was also aware that if the interior of the dryer cabinet and exhaust is not cleaned periodically additional lint can accumulate within the dryer (CDK 7/18/13; 63,65,66).

In addition to being aware of the accumulation of lint within their ball-hitch style dryers, Carl King also testified that:

- The more lint that accumulates in the dryer the greater the fuel load and risk of fire (CDK 7/18/13: 48,49; CDK 5/20/2010: 90,130; CDK, 10/23/15: 103,104);

[2] Electrolux Annual Demand Flex Foil chart (ECP_SF0062148) and Michael Stoddard inspection photo of GE flexible foil duct used to exhaust the incident dryer.

- Lint contacting the heat source is the most probable cause of a lint fire in their ball-hitch dryers (CDK 10/23/15: 270,271); and
- Lint accumulation is the most common cause of Electrolux ball-hitch dryer fires (CDK 10/23/15: 330,331).

Even though they were aware that lint was accumulating in their dryers and was the number one cause of dryer fires, Carl King testified that since 1988 Electrolux has failed to make any design changes to their ball-hitch dryers to reduce the amount of lint that accumulates in their dryers or the rate (frequency) of fires occurring with their dryers (CDK 10/23/15: 273-275,280,330,331).

Rather than implementing design changes or adding safeguards to their ball-hitch dryers to prevent lint accumulation and fires, Electrolux chose to rely on the installer/user recognizing the need to use rigid or semi-rigid metal ducting and the importance of having the interior of the dryer cabinet and venting periodically cleaned by an authorized service technician. Electrolux's cleaning recommendation requires the user to keep track of when the dryer needs to be cleaned: every 18 months or so depending upon use (i.e., greater than average use translates to shorter period of time between cleanings). To alert and inform the user of the 18 month service recommendation, Electrolux relied on the use of warnings presented in the manuals that accompanied the dryer (BR 6/22/11: 105,106; CDK, 272,273).

Product warnings and instructions are used to alert and inform users of the hazard associated with the foreseeable uses and misuses of a product (1,2). Product warnings and instructions are a means of mitigating hazards that cannot be eliminated by design or mitigated through the use of safeguards (1,2; CDK 9/16/2011: 115). The role of warnings and instructions in the widely acknowledged hierarchy of safety is based upon the fact that warnings are not as reliable as designing out the hazard or providing adequate safeguards (BR 7/18/13: 157). For these reasons, warning should be used as a supplement to adequate safeguards and not as a substitute for safe design and/or guarding (1,2).

If they chose to rely upon warnings to mitigate the fire hazard associated with the use of their dryer (i.e., if design and guarding alternatives are not available or feasible), Electrolux must ensure that their warnings are effective in motivating the user to act and behave in a safe fashion (1-5). The effective communication of warnings is also necessary so that users can make an informed decision with regard to the risks associated with the dryer's reasonably foreseeable use (e.g., no 18 month cleaning, flexible foil transition duct, etc.) (2). If Electrolux improperly relies upon warnings to mitigate product hazards or fails to provide adequate warnings they unreasonably expose their product users and others to unnecessary risks and dangers.

E.1.1. Electrolux's reliance solely on warning presented in their accompanying literature was unreasonable.

Electrolux provided an "Owner's Manual and Installation Instructions" manual (manual) with the GE dryer. Within the manual, Electrolux recommends that the user should have a qualified technician clean the interior of the machine and the dryer exhaust at least once a year. Within the manual, Electrolux also recommends the use of rigid metal or "flexible metal" 4" diameter ducting to exhaust the dryer outside.

Electrolux also provided a temporary removable Dryer Performance Checklist (temporary checklist) that was taped to the top of dryer. The temporary checklist was intended to be removed during the installation of the dryer. The temporary checklist states:

> Manufacturer **recommends** using a rigid or flexible metal vent system to minimize drying times and energy costs [emphasis added]. DO NOT use a foil or plastic vent system. A foil or plastic vent system will cause lint to build up. Lint can restrict air flow and become a fire hazard.

The checklist did not mention anything about the cleaning recommendation for the dryer interior or venting system (CDK 7/18/13: 33,34).

Contrary to contemporary industry standards and recommendations for the design and use of product warnings, Electrolux failed to provide any permanent warning directly on their GE dryer related to their mandatory use of rigid or semi-rigid ducting; the prohibition of using flexible foil ducting; and the need to have the dryer interior and exhaust system cleaned at least every year by an authorized service technician to prevent a fire (1-7; CDK 9/16/2011: 15; BR 10/25/2011: 52,88,89,91,92).

It is not reasonable for a manufacturer to rely solely on a manual and/or a temporary checklist taped to the product to communicate critical safety related information especially with commonly used products (1-6). Critical warnings must be provided where and when the information is needed and where the information is most likely to be encountered and seen (e.g., conspicuously and permanently placed on the product) (1-6).

Often product manuals will not be read, read in their entirety, or may not be available at a later date or at all (5,6,8-11). For example, warnings research has shown that product users:

- Do not have the manual available for second hand products (9);
- Are less likely to read manuals for products they do not perceive as complex (7,11);
- Are less likely to read manuals when they believe they know how to use the product; that the manual will not be helpful or provide useful information; or it is quicker to learn about the product by using it (8);
- Often do not read the entire manual and only refer to sections of the manual that are of interest (7);

- Believe hazardous products should have warnings located in close proximity to the product (10); and
- Believe products without on-product warnings are less hazardous than products with on-product warnings (10).

Standards and guidelines for the design of warning systems recommend that critical warnings be presented on the product to ensure the information is seen, read, and heeded at the time and location it is needed. For example, ANSI Z535.4, *Product Safety Signs and Labels*, provides the following recommendation for the placement of product warnings (4):

> Product safety signs and labels shall be placed such that they will: (1) be readily visible to the intended viewer and (2) alert the viewer to the potential hazard in time to take appropriate action.

In their chapter on attention capture and maintenance of warnings, published in the textbook *Warnings and Risk Perception*, Wogalter and Leonard note (3):

> In general, warnings should be located so that individuals who need to see them do in fact notice them. The layout of the environment and what people do in the environment need to be considered in placing a warning properly.

And

> In general, a warning's attention-getting power will be facilitated by placing it closer to the hazard. Thus, in most cases warning noticeability will be benefited by its attachment directly to the product (or its container) as opposed to a more "distant" placement such as in a separate instruction manual.

With respect to design and placement of critical safety warnings, Woodson et al. note in their textbook Human Factors Design Handbook (2):

> Make critical signs and signals conspicuous, legible, visible, and understandable and place them where the user is expected to be looking.

In a paper published in the journal *Occupational Health and Safety*, Peters provides the following guideline for the placement of product warnings (5):

> The warning should be placed where needed and when needed. A warning buried in an operator's manual may be of little help to a typical machine operator.

The FMC Corporation is one of the world's foremost diversified chemical companies in the world and a leader in the agricultural, industrial, and consumer markets. In their 1990 edition of their *Product Safety Signs and Label System* manual, FMC notes (6)

> When such safety signs and labels are placed on products in appropriate locations, they can help to reduce the occurrence of accidents through more effective communication.

Effective warning placement also includes the assessment of the user's interaction with the product (2,3,11,12). For familiar products, the user's interaction with the product is generally governed by pre-learned mental scripts (11,12). These mental scripts allow the user to interact with the product with little conscious thought or on auto-pilot.

Research has also shown that:

- People's hazard perception decreases the more familiar they become with a product and the more benign experiences they have with the product (13);
- As a person's perception of a hazard decreases so does the likelihood of them looking for or noticing a warning (13,14);
- People are not likely to seek information when purchasing products they are highly familiar with (15);
- As people become familiar with a product, they are less likely to look for or notice warnings (7,11);
- When people engage in familiar or common activities (e.g., installing and/or using a dryer) they do not think about unknown hazards (16,17); and
- For familiar or commonly used products, highly conspicuous warnings need to be implemented to ensure that important safety information is communicated (2,18).

These psychological factors increase the difficulty in ensuring warnings are effectively presented. However, research has shown that effective warning placement can be accomplished by understanding how the user interacts with the product and presenting the warning information at the time and place in the task sequence where it will interrupt or break into these pre-learned scripts (2,3,12).

Task analysis is used to understand how people will use a product, the steps necessary to complete each task, and the tools and information necessary to safely complete each step (2). With this understanding, task analysis is then utilized to determine when and where to present warnings (2,3,12). Product warnings can then be developed and located where they will interrupt the user's pre-learned script and result in compliance to the warning (2,3,12). For example, the warnings related to the exhaust duct installation should be presented adjacent to the exhaust opening at the rear of the dryer where it is readily visible at the time and location the information is needed (i.e., during transition duct hook up) (CDK, 7/18/13: 54,55). The warning should be repeated on a cover that needs to be removed before the transition ducting is installed. The interaction required with the cover will ensure installers are exposed to the critical safety information contained within the warning at the time and location the information is needed. Carl King, testifying as Electrolux's corporate designee, agreed that an on-dryer label is more accessible to the installer during the time he is putting the vent on the back of the dryer than a warning in the manual and that the presence of an on-dryer warning increases the likelihood the installer will be made aware of that particular warning (CDK 9/16/11: 105,106).

Safety standards applicable to the design and manufacturing of the incident dryer also recommend placing warnings where they will be visible during the normal operation of the dryer. For example, Underwriters Laboratory (UL) safety standard 2158 applies to the design and manufacturing of electric clothes dryers (19). However, Carl King and Brian Ripley have both testified that Electrolux utilizes the UL 2158 standard for the design of both their electric and gas dryer warnings (BR 7/18/13: 57; CDK 7/18/13: 75-76,79). UL 2158 requires several warnings to be placed permanently on the dryer to alert users to potential hazards (19). Consistent with the warning literature related to assessing the appropriate placement of a warning based upon the user's task, UL 2158 section 7.1.13 requires (19):

> A cautionary marking intended to instruct the operator shall be legible and visible to the operator during normal operation of the appliance. A marking giving service instructions shall be legible and visible when servicing is performed.

The UL requirement ensures the warning will be located where and when the critical safety information is needed (i.e., on the product at the task point).

If Electrolux fails to inform the user about their cleaning and/or exhaust duct requirements, they will deprive the user of critical information needed to safely use the dryer (CDK 7/18/13: 79-81). For this reason it was critical that Electrolux ensure that their cleaning and exhaust duct requirement warnings were located conspicuously and permanently on the dryer, via on-product warnings. By placing the cleaning and exhaust duct warnings conspicuously and permanently on the dryer, Electrolux would have ensured that the critical safety information was available to all users of the dryer, including the installer and owner when they were installing, using, and maintaining the dryer.

Electrolux's yearly cleaning and exhaust duct recommendations failed to comply with the standard of care for the design and development of product safety warnings used to communicate critical safety information to product users and installers.

Electrolux knew users were not likely to read all of the accompanied literature.

Electrolux was aware that installers and users of their dryers were not reading the written material they provided with the dryer, were only reading parts of the accompanying material, and/or did not have the material available when installation and/or using the dryer. For example, Electrolux's Product Safety Manager, Carl King, testified that:

- Electrolux was aware that installers and users do not read the provided manuals (CDK 7/18/13: 68; CDK 9/16/11: 88,89,104,126);
- Electrolux intended the checklist to be a temporary document that is removed after the dryer is first installed and it is foreseeable that that a professional installer would remove the checklist before the end user has the opportunity to see it (CDK 9/16/11: 84,86,87,220).

- It was foreseeable that the installer would throw out the manuals, thereby depriving the owner of the opportunity to read them (CDK 1/17/14: 66).
- Electrolux knows that people can purchase or obtain used dryers without a manual and that without the manual the new dryer owner would never know about their cleaning recommendation (CDK 7/18/13: 79-81).
- Electrolux was also aware that if the dryer user did not read the manual they will probably be unaware of the important cleaning recommendation (CDK 7/2/14: 96,97).

Carl King also testified that Electrolux was aware that when people buy houses with dryers already installed it is possible the original owner will not pass along the dryer manuals (CDK 7/18/13, 78,79). King also testified that if the new owner does not get the manual when they purchase the house they may never learn about the 18 month cleaning requirement (CDK 7/18/13, 80,81).

If the user is not informed about the 18 month cleaning requirement, lint will accumulate within the dryer and create the risk of a dryer lint fire. For this reason it was critical that Electrolux made sure the 18 month cleaning requirement warning was located permanently on the dryer, via an on product warning.

Consistent with Carl King's knowledge of the expected behavior of their dryer users, Michael Ricklefs, Electrolux Alliance series dryer project manager, testified that:

- He does not recall reading the manual for the ball/hitch Electrolux dryer he used in his home (MR 6/23/11: 65);
- He only recalls reading the specific section of the manual dealing with the control features for a Whirlpool dryer he owned prior to working for Electrolux (MR 6/23/11: 65,66);
- He does not believe his wife and kids have read a dryer manual even though they use the dryer (MR 6/23/11: 62,63,66).

Brian Ripley, lead engineer for the Alliance series dryers, testified that before he started working for Electrolux he installed a GE dryer in his own home using flexible plastic duct (BR 7/18/13: 172,173). Ripley testified that he did not read the exhaust installation section of the manual for the GE dryer and used the flexible plastic duct because the retailer recommended it (BR 7/18/13: 173).

Within the installation section of the dryer's manual and the temporary checklist, Electrolux recommends against the use of flexible foil duct for the dryer exhaust system. However, Electrolux intended the Installation Instructions for the person installing the dryer (CDK 9/16/11: 35-37). Given that the manual is titled "Installation Instructions" and intended for the dryer installer, it is foreseeable that an end user who had someone else (e.g., the retailer) install the dryer would not find the manual relevant and would not read it.

Electrolux also expected the dryer to be installed by a qualified person (CDK 10/22/15; 182,183). Although Electrolux has never stipulated what makes a person "qualified," it was foreseeable to Electrolux that many professional installers would have experience installing many different dryers over time (CDK 10/22/15; 184). As noted in the prior section, product experience and familiarity are predictors of who is likely to read a manual and how closely or completely they will read it (7,8,11). Given their experience and familiarity with dryers, it was foreseeable to Electrolux that many professional installers would not have a need or desire to consult the manual while installing the dryer (7,8,11).

Although Electrolux taped a checklist to the dryer during manufacturing, they were aware that the checklist was not permanent and was intended to be removed after the dryer was installed (CDK 9/16/11: 84,86,87,220). If the user did not install the dryer or used the dryer after it had been installed, they would not be provided with any other means informing them that flexible foil duct was prohibited or that they should be using rigid or semi-rigid duct to exhaust the dryer.

Michael Ricklefs testified that the controls on an Electrolux dryer are "intuitive" to use (MR 6/23/11: 66,67). Carl King testified that Electrolux's goal is to make the dryers easy to use (CDK 1/17/14: 83). Electrolux had no requirement for users to read the manual that accompanied the dryer before using it. If the dryer is "intuitive" and easy to use and there is no requirement to read the accompanying manual, Electrolux should have known that users would have little to no reason to consult the manual and would therefore not read the manual or scan only portions of the manual.

Furthermore, both Electrolux and GE marketed and sold flexible foil ducting for use with clothes dryers. Flexible foil ducting was sold by the same retailers who sold the dryer and, in many cases, arranged for the installation and delivery of the dryer. Electrolux was also aware that in some installation it was "impossible" to use rigid metal ducting and the install would have to use flexible foil ducting[3].

Because installers and/or users had little to no reason to consult the material, were not likely to read the material or only skim through parts of the material, would not have the manual available, and the availability and convenience of flexible foil ducting it was imperative that Electrolux ensure that the critical warnings related to having the dryer cleaned every year and the prohibition of using flexible foil ducting to prevent a lint dryer fire was presented permanently and conspicuously on the dryer itself.

Joseph and Ursy Vitale did not purchase the incident dryer. The dryer was purchased, delivered, installed prior to the Vitale's purchasing the home. The person(s) who installed and/or the prior owner of the incident dryer/home utilized flexible foil ducting to exhaust the dryer. The Vitale's were not given any manuals or other literature for the dryer. The Vitale's were not aware of Electrolux's recommendation to have the interior of the dryer cleaned at least every

[3] See Electrolux manual page 12 under Additional Installation Instructions.

year and that rigid or flexible metal ducting should be used to exhaust the dryer. The Vitale's were not aware of the fire hazard associated with the use of flexible foil ducting or lint buildup near the heat source due to lack of disassembly and cleaning of the interior of the dryer cabinet.

The unavailability of the dryer's manual and literature when given to the Vitales and the use of flexible foil ducting to exhaust the dryer were foreseeable to Electrolux and consistent with the testimony of Carl King, the testimony and actions of Michael Ricklefs and Brian Ripley, and the warnings research cited in the previous section.

Brian Ripley was responsible for the design of the warning placed on the Electrolux ball-hitch standalone dryers (BR 7/18/13: 121; BR 10/25/11: 77,79,88-90). The warnings on the dryer failed to address the yearly cleaning recommendation or the need to use rigid or semi-rigid ducting. Electrolux's failure to place warnings related to the cleaning and ducting recommendations on the dryer was unreasonable, particularly given Ripley's own experience of not always reading the dryer manual, his prior lack of knowledge that flexible ducting was not recommended, and the availability of flexible foil duct for dryer installation by other parties.

Electrolux was aware of the need to provide on-product warnings.

Electrolux was aware of the use and need of on-product warnings to communicate important safety information. For example, Electrolux's Product Safety Manager, Carl King, testified that (CDK 9/16/11: 105):

> The more times Electrolux places a warning on the product, the greater likelihood the user will read and follow the instructions.

Carl King also testified that Electrolux placed their temporary dryer operation checklist on the exterior top of the dryer to be "in your face" (CDK 7/18/13: 220).

As of at least 1997, Electrolux placed warnings related to the 18 month cleaning and exhaust duct requirements on their Laundry Center dryers. For example, in 1997, Electrolux placed a warning, permanently affixed, to the front of the Electrolux laundry center dryers (washer/ dryer combination units) which stated (CDK 9/16/11: 15,16,21-23):

> The interior of the machine and exhaust system is to be cleaned periodically (approximately every 18 months) by a qualified service personnel.

Electrolux also designed and manufactured their laundry centers with an orange hang tag on the back of the unit (CDK 9/16/11: 100,101,106,107). The orange hang tag stated:

1. Use 4" diameter (min.) metal dryer exhaust duct. DO NOT USE PLASTIC FLEXIBLE DUCT.
2. Keep exhaust duct length as short as possible (see instructions).
3. Clean out previously used house exhaust ductwork.

4. Replace any exhaust duct that is kinked or crushed.
Read Installation Instructions and Owner's Guide Instructions.

Electrolux repeated the same warning information presented on the orange tag in their laundry center manuals (CDK 9/16/11: 100-101,106,107).

As of 2004, Electrolux replaced the orange tag on the back of their laundry centers with a warning sticker that was adhered to the back of the dryer cabinet under the ventilation opening (CDK 9/16/11: 111,112,114). The warning stated (CDK 9/16/11: 111,112,114):

> WARNING: POTENTIAL FIRE HAZARD
> Use only rigid metal or flexible metal 4" diameter ductwork inside the dryer cabinet or exhausted to the outside. Use of plastic or other combustible ductwork can cause a fire. Foil or other easily punctured ductwork can cause a fire if it collapses or becomes otherwise restricted in use or during installation.

As of 2009, Electrolux provided a warning label, permanently affixed, to their stand-alone dryers instructing users to use rigid or flexible metal duct, that the use of plastic or other combustible ductwork can cause a fire, and that flexible foil duct can cause a fire if it collapses or becomes restricted (CDK 7/18/13: 53; CDK 9/16/11: 114,115).

Carl King testified that it was a good idea to include the vent requirement warning on the back of the dryer, so that the warning is immediately in the area where the person will see it when they are hooking up the dryer (CDK 7/18/13: 54,55).

Brian Ripley was the engineer responsible for preparing the Electrolux Alliance series dryer warning label that is affixed to the dryer door frame (BR 10/25/11: 9,14,55,63,79,80,88-90). Ripley testified that he was not aware that the Electrolux laundry center was sold with the 18 month service warning on the product when he was preparing the dryer door warning (BR 10/25/11: 79,89,90). Ripley also testified that it would have been a good idea to include the 18 month service warning on the Alliance series dryers (BR 7/18/13: 131; BR 10/25/11: 89,90).

Brian Ripley also testified that he would have included an 18 month cleaning warning on the inside door frame of the dryer if there was available space (BR 7/18/13: 126). Ripley testified that the information he placed in the warning located on the door frame was required by UL 2158 (BR 7/18/13: 120,121). However, Ripley included information on that warning that was not required by UL 2158. For example, Electrolux chose to include additional information that was not required by UL 2158 in the door frame warning, including their 800 number and the warning related to prohibiting children from playing on or in the dryer rather than the 18 month cleaning warning (BR 7/18/13: 123; CDK, 7/18/13: 76). Ripley later testified that he could not think of any reason why they could not have put an 18 month cleaning warning on different areas of the dryer's door frame (BR 7/18/13: 130,131). Even though he was aware of the 18 month cleaning requirement, he knew that users did not always read all of the manual, UL 2158 allowed them to place additional warnings on the dryer, and there was sufficient space

to place the warning on the inside door frame of the dryer, Ripley failed to include an 18 month cleaning warning on the dryer itself (BR 7/18/13: 120,124,130,131).

It was not reasonable for Electrolux to rely solely upon the use of manuals and a checklist to warn installers and users that the incident dryer needed to be cleaned at least once a year, that flexible foil venting should not be used, and that lint buildup near the heat source and a fire can result if these instructions are not followed. Electrolux should have conspicuously and permanently placed the warnings directly on the dryer and the dryer was defective and unreasonably dangerous without them.

E.1.2. Electrolux's failed to provide effective warning in their manual.

Electrolux claims they provided a 24 page "Owner's Manual and Installation Instructions" manual (manual) with their GE dryer. The manual consists of five main sections: Safety Instructions, Operating instructions, Installation Instructions, Troubleshooting Tips, and Consumer Support. With respect to cleaning the interior of the dryer cabinet and exhaust at least once a year, Electrolux notes on page 4 of their manual, under the *Safety Instructions*: *When Using Your Dryer* section:

> The interior of the machine and the exhaust duct connection inside the dryer should be cleaned at least once a year by a qualified technician. See the Loading and Using the Dryer section. Do not use any type of spray cleaner when cleaning dryer interior. Hazardous fumes or electrical shock could occur.

Electrolux also provides the following instructions on page 8 of their manual under the *Operating Instructions: Care and Cleaning of the Dryer* section:

> Have a qualified technician vacuum the lint from the dryer once a year.
>
> The Exhaust Duct: Inspect and clean the exhaust ducting at least once a year to prevent clogging. A partially clogged exhaust can lengthen the drying time.
>
> Follow these steps:
> 1. Turn off electrical supply by disconnecting the plug from the wall socket.
> 2. Disconnect the duct from the dryer.
> 3. Vacuum the duct with the hose attachment and reconnect the duct.
>
> The Exhaust Hood: Check with a mirror that the inside flaps of the hood move freely when operating. Make sure that there is no wildlife (birds, insects, etc.) nesting inside the duct or hood.

Electrolux also provides the following instruction on page 13 of the manual under the Installing the Dryer:

Exhaust Ducting Length
The exhaust system should be inspected and cleaned at least once a year with normal usage. The more the dryer is used, the more often you should check the exhaust system and vent hood for proper operation.

With respect to selection of ducting to exhaust the dryer, Electrolux notes on page 3 of their manual, under the *Safety Instructions: Proper Installation* section:

Exhaust/Ducting:
1. This dryer **MUST** be exhausted to the outside.
2. Use only rigid metal or flexible metal 4" diameter ductwork inside the dryer cabinet or for exhausting to the outside. **USE OF PLASTIC OR OTHER COMBUSTIBLE DUCTWORK CAN CAUSE A FIRE. PUNCTURED DUCTWORK CAN CAUSE A FIRE IF IT COLLAPSES OR BECOMES OTHERWISE RESTRICTED IN USE OR DURING INSTALLATION.**

Follow details in the Installation Instructions section

Note that Electrolux does not specifically or explicitly reference the use of flexible foil ducting in this warning. Electrolux also fails to define or differentiate "flexible metal" ducting from flexible foil ducting.

Within the Installation Instructions sections of their manual, Electrolux notes under the heading *Preparing to install your dryer*:

WARNING
- This dryer must be exhausted to the outdoors using only rigid metal or flexible metal 4" diameter ductwork for inside the dryer cabinet or exhausting.
- ***Never use plastic or other combustible ductwork. See Exhausting section.***

Under the *Exhausting the dryer* section of the manual, Electrolux notes:

Exhaust System Requirements
Use only 4" (10.2 cm) diameter (minimum) rigid metal duct for best performance, or flexible metal duct. ...
If all rigid metal duct cannot be used, then flexible all-metal venting can be used, but it will reduce the maximum recommended duct length. See *Additional Installation Instructions* following.
WARNING: The following are specific requirements for proper and safe operation of your dryer. Failure to follow these instructions can create excessive drying times and fire hazards.
DO NOT use plastic flexible duct to exhaust the dryer. Excessive lint can build up inside exhaust system and create a fire hazard and restrict air flow. Restricted air flow will increase drying times. If your present system is made up of plastic duct or metal foil

duct, replace it with rigid or flexible metal duct. Ensure the present duct is free of any lint prior to installing dryer duct.

Contrary to the characteristics of an effective warning, the warnings in the Electrolux manuals (2-6,20,21):

- Are not placed where they are likely to be seen and read.
- Do not possess the conspicuity enhancing characteristics necessary to attract attention.
- Do not provide explicit and specific information with respect to identifying the hazard, how to avoid it, and the consequences of failing to heed the warning.
- Heeding the warnings in the manuals may not prevent a lint fire.

Electrolux failed to prominently and conspicuous present the warnings in their manuals.

As noted above, based upon Electrolux's own corporate testimony, lint buildup is the most common cause of the greatest hazard (i.e., dryer fire) associated with the use of an Electrolux ball-hitch dryer. However, Electrolux failed to prominently and conspicuously present their lint fire hazard warning in their manuals. For example, even though they were aware that lint was accumulating in their dryers and was the number one cause of dryer fires, Electrolux does not address the hazard until page 4 of the manual (CDK 10/23/15: 270,271,330,331). Furthermore, on page 4 of their manual, Electrolux presents sixteen bulleted "Important Safety Information Warnings" in two columns. However, Electrolux chose to present their cleaning recommendation (i.e., the most important warning on the page related to preventing the fire hazard created by lint build up) as the fifth bullet down in the second column on the page. Similarly, within the Care and Cleaning section of the manual (page 8) the recommendation to have a qualified technician vacuum the lint from the dryer once a year is presented after cleaning the exterior of the dryer and lint screen.

Although they were aware that people commonly use flexible foil ducting to exhaust their dryers[4], Electrolux only mentions the prohibitions of using "metal foil[5]" ducting once in their 24 page manual, on page 12. Furthermore, Electrolux buries their reference to "metal foil" ducting within a paragraph that begins with statements regarding the prohibition of using "plastic flexible duct."

Electrolux also failed to highlight or otherwise distinguish their cleaning recommendation warning within the manual. For example, on page 4 of the manual, Electrolux fails to use any bolding, coloring, highlighting, larger text, or borders to distinguish their cleaning recommendation from the warnings addressing other less common hazards. On the contrary,

[4] Electrolux's November 2000 Service Bulletin notes "Unfortunately most people use the flexible tubing shown in diagrams D, E, and F." The diagrams depict the use of flexible ducting. Carl King also testified that flexible foil ducting is the most common type of ducting he sees used during his fire investigations (CDK 7/18/13:; 35,41-44).

[5] Metal foil is another term that Electrolux uses to describe flexible foil ducting.

Electrolux uses bold print to highlight the warning "**Clean the lint filter before each load**..." Under the Care and Cleaning section of their manual, Electrolux failed to differentiate their cleaning recommendation information from any of the other information on the page. Electrolux also failed to use a signal word or signal word panel to identify the cleaning recommendation information as a warning. Similarly, Electrolux failed to differentiate their prohibition of flexible foil ducting from their warning not to use plastic flexible duct.

Highlighting the critical cleaning and flexible foil warnings on the pages of their manual was critical given Electrolux's failure to prominently locate the warnings within their manual (2-7,10,22). Electrolux should have prominently and conspicuously presented the warnings related to their cleaning recommendation and prohibition of flexible foil ducting in their manuals.

Electrolux failed to provide explicit and specific warnings in their manuals.

To be effective warnings also need to be specific and explicit (1,2,4-6,20,21). Explicitness refers to the complete and precise presentation of information within the warning so that users do not have to infer a meaning, consequence, or instruction on how to avoid the hazard (20,21). Specific and explicit warning information is necessary so that product users can identify the specific hazard, appreciate the consequences of failing to heed the warning, understanding what is needed to avoid the hazard, and are motivated to comply with the warning (1,2,4-6,20,21). Research has shown that explicit information within warnings leads to (2,20,21):

- A higher level of perceived danger and injury severity associated with the hazard;
- Increased memory and understanding of the hazard;
- Better understanding of what should or should not be done and how to avoid the hazard;
- Greater compliance and intent to comply with the warning; and
- The belief that the manufacturer is concerned with user safety.

In comparison, warnings that are incomplete or not explicit and specific create the potential for the user to interpret the instructions differently than what the warning designer intended, not have all of the information they need to identify and appreciate the hazard and how to avoid it, and/or misunderstand the consequences of their actions (2,20,21).

Within their manual, Electrolux intends the phrases "interior of the machine" and "from the dryer" to mean all areas inside the cabinet of dryer: under, above, behind, around the drum; top of motor; heater housing; and baffle (CDK 5/20/12: 78-80). Electrolux also requires the drum to be removed from the dryer to clean the heater housing (CDK 5/20/10: 83). However, Electrolux fails to explicitly inform the user of this definition as opposed to meaning only inside the dryer drum (CDK 5/20/12: 80). Carl King, Electrolux Product Safety Manager, testified that Electrolux's does not define what is meant by inside the cabinet nor does it list the areas to be cleaned (CDK 10/23/15: 74). Electrolux also fails to explicitly inform the user that the entire duct system must be cleaned including the dryer exhaust, transition duct, and permanent

house duct (i.e., Electrolux fails to state that the permanent house duct should be cleaned as well as the transition duct and vent hood). Electrolux's failure to explicitly state what needed to be cleaned can result in users not identifying the need to remove the drum and clean within the heater pan. For example, David Fuller, Electrolux Quality Engineer from dryers, testified that he cleans his Electrolux dryer yearly. However, Fuller does not remove the drum and was not aware that lint could build up in the heater pan where it can be ignited by direct contact with the heat source (DF, 161,175).

Electrolux's warning also fails to explicitly inform the user as to why the dryer interior and exhaust should be cleaned (i.e., due to lint buildup behind the drum and near the heat source which creates a fire hazard). Without knowing that lint can build up near the heat source even within a properly exhausted and operating dryer and cause a fire, users may discount the need to have the dryer cleaned and not appreciate the potential fire hazard. For example, David Fuller testified that he was not aware that the yearly cleaning requirement was recommended to prevent lint building near the heat source where it could be ignited (DF, 174). Even though the Vitales disassembled and cleaned the dryer exhaust yearly, they were not aware of the propensity of lint to build up within the dryer cabinet near the heat source (UV, 41; JV, 15).

Although Electrolux refers to a "qualified technician" with respect to cleaning the dryer interior, Carl King testified that he has never seen Electrolux define the term, Electrolux's manual does not state that you have to hire somebody to do the cleaning, it was foreseeable that the term maybe ambiguous, and an end user may believe that they are qualified to service and/or clean the dryer (CDK 5/20/12: 78; CDK 10/23/15: 74,75). Without clarifying what they intended, Electrolux left it up to the user to infer who was qualified or if they could consider themselves qualified to clean the dryer. Electrolux's failure to define who was qualified to clean the dryer is compounded by their failure to explicitly state what needed to be cleaned and/or the manner in which it would be cleaned (e.g., disassemble the cabinet and remove the drum). Many users would rightly assume that they were qualified to clean the interior of the drum or running a vacuum or lint brush down the lint trap or through the exhaust ducts unaware of the extent of cleaning that is required (e.g., removing the dryer drum). For example, Joseph Vitale was an automotive technician and believed he was qualified to disassemble and clean the dryer exhaust.

With respect to their yearly cleaning recommendation, Electrolux chose to use the word "should" rather than a more definitive word such as "must" or "shall." The term "should" is defined as, and implies the instruction is, a recommendation, advisory, or optional (4). On the contrary, the word "must" or "shall" is defined as, and implies the instruction is, a mandatory requirement (4). With respect to her interpretation of the 18 month cleaning instruction as a requirement or recommendation, Shelly Clausen testified (SC, 132):

> "I look at that, and I see the word 'should,' and 'should' is a -- is not a 'must' or a 'shall.' I consider that as a -- a recommendation."

Clausen also testified that she takes the word "should" as a recommendation and not as a warning (SC, 132,133).

Within the *Installation Instructions: Exhausting the dryer* section of the manual, Electrolux notes:

> If all rigid metal duct cannot be used, then flexible all-metal venting can be used, but it will reduce the maximum recommended duct length. In special installations when it is impossible to make a connection with the above recommendations, then UL-listed clothes dryer transition duct may be used as transition venting between the dryer and wall connection only. The use of this ducting will affect drying time.
>
> ***If flexible transition duct is necessary, only UL-listed duct identified for use with clothes dryers is approved.***

Electrolux's statement implies that it is permissible to use UL approved flexible foil ducting to exhaust the dryer under certain conditions. For example, GE branded UL approved flexible ducting was used to exhaust the incident dryer.

Ursy Vitale cleaned the lint screen every time she used the dryer (UV, 20). Ursy also cleaned the interior of the dryer drum and top of the dryer cabinet periodically (UV, 20-22,24). Ursy would also use a broom and dust buster to clean any visible dust around the dryer (UV, 24,25). Joseph Vitale moved the dryer from the wall, cleaned behind the dryer, disassembled and cleaned the dryer exhaust, and checked to ensure there was good air flow through the exhaust with no leaks at least once a year (JV, 8,11,15). The Vitales did not experience any problems with the dryer, unusual drying times, or notice any damage to their clothing (JV, 15,16; UV, 20,25). Based upon a lay person's reading of the Electrolux instructions, the Vitales complied with Electrolux's non-mandatory recommendation to clean the interior of the dryer and exhaust on a periodic basis.

Electrolux provides the following information, under the Troubleshooting Tips: *Before you call service…* section of their manual:

Problem	Possible Causes	What To Do
Clothes take too long to dry	Lint filter is full	Clean lint filter before each load
	Improper or obstructed ducting	• Check installation instructions for proper ducting/venting. • Make sure ducting is clean, free of kinks and unobstructed. • Check to see if outside wall damper operates easily. • Check the Installation Instructions to make sure the dryer venting is correct.

However, Electrolux fails to identify these occurrences as a potential fire hazard or present the information as a "safety message" with the use of a safety alert symbol and signal word.

Electrolux failed to provide explicit and specific warnings in their manuals regarding their annual cleaning recommendation and prohibition of using flexible foil ducting. Electrolux should have provided explicit and specific warnings in their manuals and the dryer was defective and unreasonably dangerous without them.

Following Electrolux's warning may not prevent a fire.

To be effective the user must be able to comply with the warning and by complying with the warning the hazard must be avoided (2). Contrary to this basic requirement for an effective warning, it is possible for a user to comply with Electrolux's lint fire hazard warnings by using rigid or semi-rigid ducting to exhaust the dryer and plan on having the dryer cleaned every year by a "qualified technician" and still experience a fire hazard. For example, Brian Ripley, Electrolux lead ball-hitch dryer design engineer, testified that Electrolux does not know if their cleaning warning would be effective even if a user read the information (BR 6/1/12: 131). The failure of Electrolux's lint fire hazard warning to prevent a fire is due to the fact that:

1. Electrolux's warning is based upon an average use of the dryer. However, if someone uses the dryer five times as often as the average user, the dryer will require cleaning five times sooner (CDK 10/23/15: 349,350). If the user notices, reads, understands, and intends on complying with the warning, they may experience a dryer fire before the yearly interval if the dryer is used more often than the assumed average (CDK, 10/23/15: 352,355,356).
2. Electrolux does not provide any information for "qualified technicians" on how to clean the dryer or which parts and areas need to be cleaned (CDK, 10/23/15: 73-75). The result of Electrolux's failure to inform the servicer on how to properly clean the dryer is the potential for the user to comply with the warning and hire a qualified technician to clean the dryer who does not clean it properly or mitigate the fire hazard associated with lint buildup in areas of the dryer than cannot be readily seen without dismantling it (e.g., behind the drum near the heat source).

Electrolux failed to provide effective warnings in their manuals regarding the lint fire hazard, the prohibition from using flexible foil ducting, and the requirement to have the interior of the dryer and exhaust cleaned every year. Electrolux should have provided prominently placed, conspicuous, legible, explicit and specific warnings in their dryer manuals and the dryer was defective and unreasonably dangerous without them.

Electrolux failed to provide an adequate warning system, which included conspicuous and explicit on-product warnings, which met contemporary industry standards, guidelines, and practices regarding the lint fire hazard associated with the improper maintenance and installation of the dryer.

Electrolux's failure to provide an adequate warning system regarding the lint buildup fire hazard, which included the use of conspicuous and explicit on-product warnings, was unreasonably dangerous, rendered the GE dryer defective and unreasonably dangerous, needlessly placed consumers and product users in danger, and caused the fire.

Electrolux's failure to provide an adequate warning system regarding the lint buildup fire hazard deprived Joseph and Ursy Vitale of critical safety information they needed to safely use the dryer. For example, Ursy Vitale testified that prior to the fire she were not aware that lint could build up within the dryer near the heat source creating a fire hazard (UV, 41). Ursy also testified that she was not aware that Electrolux recommended that the dryer should be completely disassembled and lint cleaned out by a qualified technician (UV, 41). Joseph Ursy never replaced the flexible foil ducting used to exhaust the dryer even though he checked it yearly and replaced the other components of the dryer exhaust to make sure they were in good condition (JV, 14,15).

Electrolux's failure to comply with long known applicable guidelines, practices, and the American National Standard Z535.4 deprived Joseph and Ursy Vitale of the protection afforded to the public by those guidelines and standards.

Electrolux's failure to provide an adequate warning system regarding the lint buildup fire hazard is evident in their Service literature. For example, in their November 2000 Service Bulletin, Electrolux acknowledges:

> We discourage the use of flexible vinyl or foil vent tubing in favor of the far superior rigid metal pipe, or the flexible variety of metal pipe. **Unfortunately, most people use the flexible tubing shown in diagrams D, E, and F.** [emphasis added]

Electrolux's failure to provide an adequate warning system is also evident in Carl King's investigation of more than 600 Electrolux dyer fires. For example, King testified that flexible foil ducting is the most common type of duct he sees used in his fire investigations (CDK 7/18/13: 35,41-44). King also testified that during his fire investigations he very often finds the interior of the dryer was not cleaned (CDK 7/18/13: 65).

E.2. Electrolux failed to take advantage of the information available to them.

Electrolux was aware that lint fires were a potential hazard associated with the use of their ball-hitch style dryers. To protect against a lint related fire, Electrolux relied on the dryer installer and user to read, understand, recall, and comply with the warnings in their manuals and checklist regarding the need to have the dryer cleaned at least once every year, the prohibition of using flexible foil ducting, and the need to use rigid or semi-rigid duct in the dryer exhaust system.

However, Electrolux never evaluated the warnings in their manual and checklist to determine if they were effective and if users were noticing, reading, comprehending, and complying with them (BR 6/1/12: 130,131). Brian Ripley, lead dryer design engineer responsible for the dryer door label, testified that he is not aware of any testing that Electrolux has ever done or had performed to evaluate the effectiveness of the warnings and instructions in their dryer manuals and checklist (BR 10/25/11: 9,14,55,63,79,80,88-90; BR 6/1/12: 130,131). Brian Ripley also testified that Electrolux does not know if the cleaning warning in their manual would be effective even if a user read the information (BR 6/1/12: 131).

Electrolux was also aware that many of their dryer were vented using flexible foil duct and that many of the dryer fires reported to them involved dryers that had not been cleaned and/or installed with flexible foil duct. Even with this knowledge, Electrolux did nothing to test or validate the effectiveness of the warnings in their manuals and checklist to alert users of the fire hazard and how to safely avoid it (BR 6/1/12: 130,131).

There were multiple avenues available to Electrolux to assess the effectiveness of their warnings and user instructions (1,23,24). These methods included heuristic evaluation by an expert in warning design, convenient/hallway testing, usability testing, focus groups, and end user surveys (23,24). Electrolux could have also analyzed their warranty and claims data to determine if users were not complying with their warnings and instructions (1). It is common for product and appliance manufacturers, such as Whirlpool, to assess the usability of their products, including dryers, and the efficacy of their product warnings and instructions. Without some form of evaluation Electrolux had no ability to determine if their warning system was effective, if users are receiving the information, understanding the information, and/or able to comply with the warning (3).

Electrolux's failure to assess the efficacy of their warnings and instructions was improper, unreasonably dangerous, contrary to common industry practices, and was a cause of the fire. Electrolux's failure to assess the efficacy of their warnings and instructions were even more egregious considering that (a) lint accumulation is the most common cause of Electrolux ball-hitch dryer fires and (b) Electrolux never made any design changes to their ball-hitch dryers to reduce the amount of lint that accumulates in their dryers or the rate (frequency) of fires occurring with their dryers (CDK 10/23/15: 273-275,280,330,331).

As a corporation, Electrolux had information available regarding how their dryers were being used in the field, if users were complying with their warnings and instructions, and the extent of the fire hazard associated with lint buildup within the dryer. For example, Electrolux's claims department possessed a database (i.e., STARS database) with all the claims reported to their claims department (CDK 7/18/13: 8-10). The database captures information on the model of dryer, information on the alleged incident, and the date of loss. In 2003 alone, the STARS database captured 135 reported dryer fires. Electrolux also employs "Product Safety Managers" such as Carl King to investigate dryer fire claims reported to Electrolux. Carl King testified that Electrolux investigates each dryer fire claim they receive (CDK 7/18/13: 23). Electrolux's investigations provide information related to the type of exhaust duct used, if there

was lint buildup within the dryer, whether the lint had been cleaned from the dryer, and if the lint created fuel for the fire (CDK 7/18/13: 41-44,63,65).

However, the claims and fire testing information was never shared with the engineering staff responsible for the design and development of Electrolux's ball-hitch style dryers (including the incident dryer) or used to assess the efficacy of their warnings or instruction related to their cleaning recommendation and flexible duct prohibition. For example, Carl King testified that the information in their Stars database is not shared with the engineering department (CDK 7/18/13: 25). King also testified that he does not know if the dyer design engineers ever saw the results of their fire investigations (CDK 10/23/15: 100).

Consistent with King's testimony, Brian Ripley, lead Alliance series dryer engineer, testified that:

- He does not know what the STAR system is, he was not provided with any information regarding dryer fire claims, and he has never asked for information regarding dryer fire claims (BR 7/18/13: 98-101).
- He has never participated in a meeting with Carl King to discuss King's dryer fire investigations nor has he ever received any of King's reports from those investigations (BR 6/1/12: 64; BR 6/22/11: 64).
- He does not receive the Service Flashes relevant to dryers created and published by the Electrolux Service group (BR 6/1/12: 146,156,157).
- He was not aware that in 2000 most users were using flexible foil duct to exhaust their dryers even though a 2000 Electrolux Service flash stated that was the case (BR 7/18/13: 161-165).

Michael Ricklefs was a senior design engineer working on Electrolux's ball-hitch style dryers since 1998 (MR 6/23/11: 12,13,18). Ricklefs was later promoted to staff engineer in 2005 and was the project manager for new dryer development (MR 6/23/11: 18,19). Ricklefs testified that he never discussed warranty claims with Carl King; never saw any warranty claim information regarding dryer fires; was not aware of how many dryer fires were reported to Electrolux each year; never saw any data from the STAR system; and had no input into the Service Flashes (MR 6/23/11: 51,79,80,90,91,164,165,192-194).

David Fuller was the Electrolux quality engineering assigned to dryers from about 1999 to 2011 (DF, 127). David Fuller testified that no one ever communicated to him the number of reported fire or personally claims involving an Electrolux dryer while he was employed as the quality engineer for dryers (DF, 268). As of the day of his deposition in the Cloud matter on January 13, 2016, Fuller had no idea how many fires reportedly occurred as a result of lint buildup within Electrolux dryers (DF, 268).

The information related to dryer fires and how users were using the dryer possessed by Electrolux was important and should have been passed to the engineering group responsible for the design and development of the dryers to improve and ensure the safety of the product. For example, Brian Ripley testified that had he known that there have been 300 Electrolux dryer

fires related to users not having their dryer's interior cleaned by an authorized servicer because they were not aware of the recommendation, he would have investigated possible ways to re-design the dryer to take that fact into account (BR 7/18/13: 147). Ripley also testified that had he known that more than half of dryer users used flexible foil ducting he would have worked to find a more economical way to get rigid or semi rigid ducting to customers; he would have informed Electrolux Sales and Service people that flexible foil ducting was not recommended; and he would have instructed the Sales and Service people to initiate an education program to alert the retailers to use rigid or semi-rigid ducting (BR 7/18/13: 154,156,157).

Michael Ricklefs testified that it would be important to know if their dryers were catching fire (MR 6/23/11: 75). Ricklefs also testified that it was important to know how the product is being used in the field with actual users so they can continually improve the performance and safety of the dryer (MR 6/23/11: 74). Ricklefs also testified that the dryer engineering group would want to know if their cleaning warning was not proving to be an effective measure (MR 6/23/11: 201).

David Fuller testified that had he known that restricted airflow was causing 100s or 1000s of dryer fires he might have factored that information into how he treaded the service call data (DF, 268,269). Fuller also testified that had he known about the number of fires related to restricted airflow in 2002 he would have spoken to someone about issues a service flash to address the issue (DF, 278,279).

Electrolux's failure to exercise reasonable diligence in the use of their service, warranty, and claims data to assess and improve the effectiveness of their product warnings was unreasonably dangerous, improper, and a cause of the fire. For example, even after investigating 600 to 700 dryer fires and finding that many of their dryers were installed using flexible foil duct and/or did not have the interior of their dryer periodically cleaned by an authorized service technician, Carl King, Electrolux Product Safety Manager, testified that Electrolux never changed, altered, or assessed their instructions or warnings (CDK 7/18/13: 50,51,68,69).

E.3. Electrolux should have provided an adequate warning system.

In his February 26, 2016 report, Michael Stoddard concluded that in lieu of using the safer alternative bulkhead design, Electrolux should have designed the dryer with a safety device to monitor air flow through the dryer and shut the dryer down when the air flow was significantly reduce. Alternatively, or in conjunction with, the air flow monitoring device, Stoddard opined that Electrolux should have provided a safety device to monitor the use of the dryer (count the number of cycles) and shut the dryer off when the cycle count exceeded 625 cycles (Electrolux's

assumption of use at 18 months[6]). In either case, the safety features would force a service call and prevent the development of a hazardous condition that could result in a dryer lint fire.

Because alternative safeguards were available to mitigate the fire hazard associated with lint buildup within the dryer, the only adequate warning system that Electrolux could have provided was in conjunction with one or both of the safeguards.

Stoddard concluded that an indicator light(s) should have been used with the air flow monitoring device and/or cycle counter to alert the user to the need to have the dryer professionally serviced. Indicator lights are used as special hazard condition lights to alert users to a potential hazard that they may not be aware of unless the light is provided (2,23). Indicator lights are also used to alert and inform product users of the need to service the product. For example, passenger vehicles often come with a service indicator light that alerts the driver when it is time to have the oil changed (CDK 7/2/14: 104; BR 7/18/13: 141); thermostats have an indicator light that comes on when it is time to change the filter in the HVAC system or replace the battery in the thermostat; vacuum cleaners are design and sold with an "Electronic performance indicator" light that "...lets you know when a clog or full bag is reducing suction;" refrigerators are sold with change filter indicator lights; clothes washers are sold with a "Clean Washer Reminder" indicator light that comes on after 30 wash cycles; and some higher-end clothes dryers are sold with an indicator light and audible alarm (beep) to alert users to restrictions in the dryer's exhaust. Other household appliances also use indicator lights to alert and/or remind users to the state of the system. For example, glass stove tops have indicators lights to alert the user when the heating element is on or hot after the unit has been turned off.

In conjunction with the indicator light(s), Electrolux should have ensured conspicuous, specific, and explicit on-product warnings were provided on their Frigidaire ball-hitch style free standing dryers, including the incident dryer. The warnings should have been placed on top of the dryer and the back of the dryer, where relevant (see below), and repeated within the manuals, checklist, and operating instructions for the dryer.

The warning on the top of the dryer should have addressed the need to have the interior of the dryer and complete exhaust system cleaned at least once a year; the potential of lint to build up near the heat source and fire hazard if the dryer is not cleaned; and/or the meaning of the different states of the indicator light(s). The warning on the back of the dryer should have

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[6] Electrolux determined that their ball-hitch dryers needed to be cleaned every 18 months to prevent lint buildup and prevent a lint fire and typically recommended an 18 month cleaning interval in the manuals for its Electrolux, Frigidaire, and Kenmore branded dryers. The 12 month cleaning interval referred to in the manual of the subject GE branded dryer is consistent with cleaning interval referred in the manuals for other GE dryers that were not manufactured by Electrolux. Electrolux has not provided any information as to why there is a discrepancy in their cleaning recommendations between their GE branded ball-hitch dryers and their other ball-hitch dryers.

addressed the prohibition of using flexible duct and the need to use rigid or semi rigid metal duct to prevent lint build up near the heat source and reduce the risk of fire.

Placing the warning on the top of the dryer would have ensured it was highly conspicuous to users every time they used the dryer. For example, Carl King testified that Electrolux positioned their checklist on the exterior top of the dryer to be "in your face" (CDK 7/18/13: 220). Dryers are typically installed in basements and laundry rooms. They are not appliances that are typically displayed for aesthetic reasons (e.g., a stove or range in a custom kitchen). Therefore there are no aesthetic drawbacks from placing the warning on the front of the dryer cabinet where it is always visible when using the dryer as opposed to hidden on the inside frame of the door that is not visible with the door closed (2,3).

The warning on the back of the dryer should have specifically and explicitly informed readers:

- Connect dryer exhaust to rigid or semi-rigid metal transition and house duct only;
- Do not install dryer if transition or house duct is flexible foil or plastic/vinyl;
- Do not install dryer to house duct with a screen covering the house exhaust outlet;
- Clean the entire house exhaust system during installation and before use;
- See Installation Instructions for unique and Electrolux specific installation requirements.

The warning on the back of the dryer should have been accompanied by graphic depictions of the correct way to install the dryer as well as the incorrect use of flexible ducting. Electrolux provides such depictions on the November 2009 version of their temporary checklist and in their November 2000 service bulletin (issue #11).

Illustration 1 presents an example of an on-product warning meeting the ANSI Z535.4-2002 criteria for on-product safety warnings that should have been permanently presented on the top of the Electrolux dryer near the indicator light if it was provided (4).

The warning depicted in illustration 1 should have been repeated in the manuals and checklist. The warnings in the manual and checklist should have explained and depicted the areas of the dryer and exhaust system that need to be cleaned by an Electrolux authorized service technician. For example, the warnings should have stated that the inside of the dryer cabinet, including behind the drum and lint screen housing and around the heat source, must be cleaned at least every year and users should regularly inspect and clean any and all lint from the outdoor exhaust opening. The warnings in the manual should have include a graphical illustration of the areas of the dryer and dryer exhaust system that must be inspected and cleaned regularly. Illustration 2 is an example of a graphical illustration that Electrolux should have provided in their manuals to depict and explain the areas of the dryer and exhaust that needed to be inspection and cleaned.

⚠ WARNING

Fire Hazard!

- Service Indicator Light:
  - When light flashes have dryer cabinet and house exhaust cleaned by an Electrolux authorized service technician.
  - Lint build up inside the dryer cabinet (near the heat source and behind the drum) and exhaust duct can ignite and cause a fire!
  - When light stays on, dryer will automatically shut down. Call for service.
- Clean lint screen each time you use the dryer.
- Regularly inspect and clean outdoor exhaust opening.

Illustration 1. Front console warning.

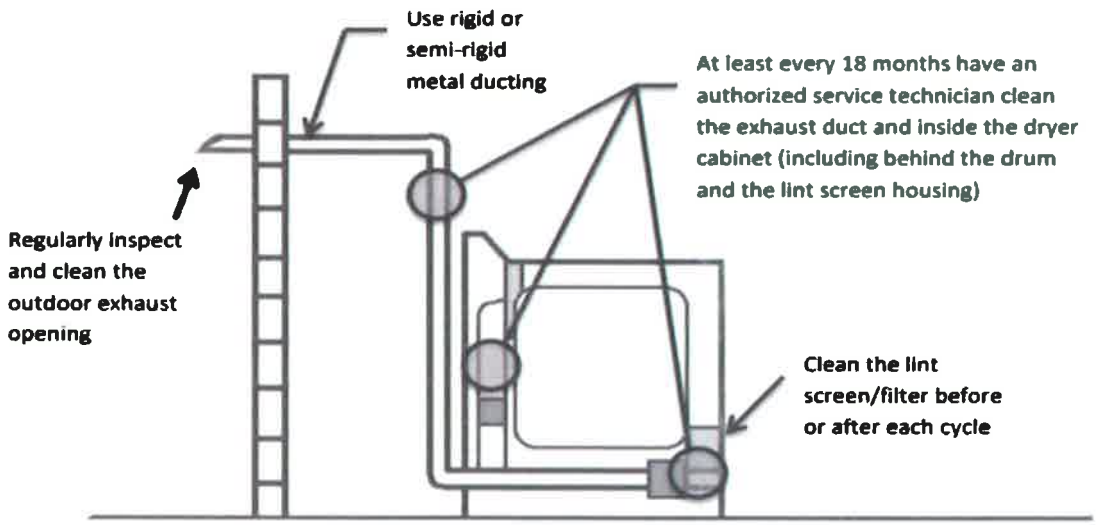

Illustration 2. Cleaning graphic for manual.

If Electrolux chose not to provide the available safeguard(s) and associated indicator light(s), the very least they should have done was provided a conspicuous warning attached to the top or front of their dryer informing users of the yearly cleaning requirement. Illustration 3 presents an example of an on-product warning meeting the ANSI Z535.4-2002 criteria for on-product safety warnings that at the very minimum should have been permanently presented on the top or front of the dryer (4). The warning and graphical illustration should have been repeated in the manuals and checklist.

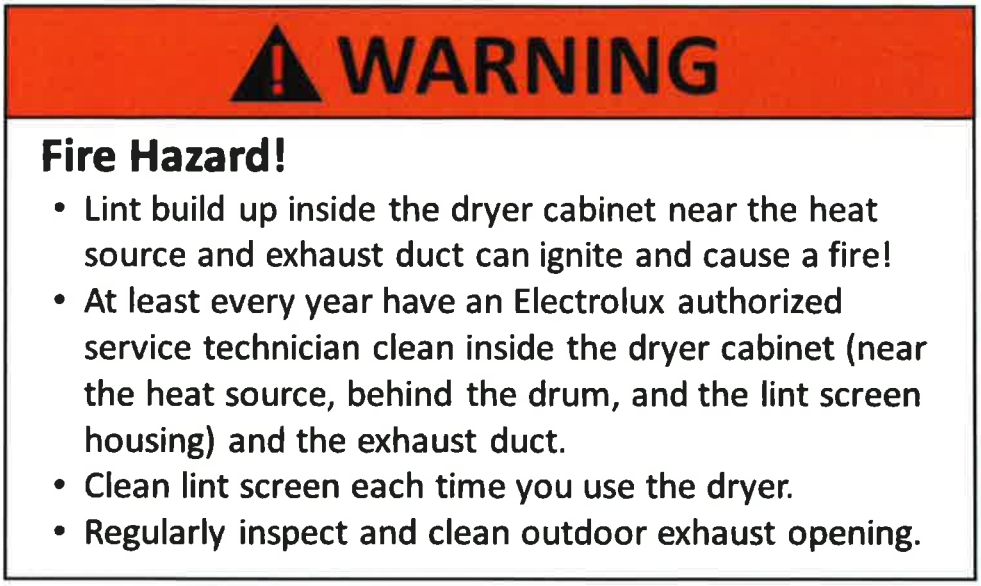

Illustration 3. Alternative front console warning.

Illustration 4 presents an example of an on-product warning meeting the ANSI Z535.4-2002 criteria for on-product safety warnings that should have been permanently presented on the back of the dryer adjacent to the dryer exhaust (4). An abbreviated version of the warning with message text and signal word only should have been placed on a cover that must be removed from the dryer exhaust before the transition duct is attached (this warning should contain an additional bullet that state "remove cover before attaching external vent") (5,12,13). The full warning should also be repeated in the manuals, Operating Instructions, and checklist.

Illustration 4. Dryer cabinet rear warning.

It would have been reasonable for Electrolux to provide an adequate warning system, including two conspicuous, specific, and explicit on-product warnings, with their GE branded dryer. The cost in terms of money, effort, and time to do so would have been minimal and insignificant. For example, Electrolux has been providing the 18 month cleaning service warning and the flexible foil prohibition/clean out previous used house exhaust warning on the front and rear, respectively, of their laundry centers since at least 1997 (CDK 9/16/11: 15,16,21-23).

Electrolux engineering department had discretion on the layout, placement, and content of the product labels and warnings and Electrolux made changes to their labels all the time (BR 10/25/11: 91,92; CDK 9/16/11: 20,24). For example, Electrolux's Product Safety Manager, Carl King testified that Electrolux could have attached a warning regarding the duct/vent material directly to the dryer cabinet (CDK 9/16/11: 109). Brian Ripley testified that it would have been a good idea to include the cleaning warning on the dryers (BR 7/18/13: 131; BR 10/25/11: 89,90). Ripley also testified that he could not think of any reason why they could not have put a cleaning warning on different areas of the door frame (BR 7/18/13: 130,131).

Had an adequate warning system, including two conspicuous, explicit, and specific on-product warnings, been provided, Electrolux would have ensured that Joseph and Ursy Vitale were provided with the information they needed to make an informed decision as to their use and maintenance of the incident dryer and avoided the fire. For example, Ursy Vitale testified that she would have complied with a conspicuous warning label presented on the dryer in a visible location that stated the dryer had a propensity to collect lint in the dryer cabinet near the heat source and that if you did not have the interior of the dryer cleaned there was a chance of fire (UV, 41).

E.4. Foreseeable Use

To respond appropriately to a given hazard, a person must have a reasonably accurate and conscious appreciation of the nature and magnitude of the risks involved (2,3,14). However, research has shown that people have great difficulty in perceiving, structuring, and processing risk related information (2,13,16,17). For example, within their textbook entitled *Human Factors Design Handbook*, Woodson, et al. notes the following natural behavioral expectancies and safety implications that should be taken into account when designing products (2):

- People generally regard products as being safe; ...
  - Although the assumption of "safe" should not be made, the fact that it is tends to preclude users from thinking safety, thus reducing the likelihood that they will anticipate possible hazards and make the necessary checks.
- Across the broad consumer population there is a lack of knowledge about, and experience with, the technological features of many products, e.g.,: mechanical relationships; thermal characteristics; gaseous and combustible materials and conditions leading to explosion or fire.

  - Since consumers generally are not prepared either to anticipate or to analyze conditions or the possible result of incompatibilities among physical elements and phenomena, they inadvertently initiate events that lead to improper and hazardous interactions. And because many consumers do not know ..., what causes materials to ignite or explode, ..., they do not approach the product prepared to deal with these hazards.
- Because of overconfidence, individuals often proceed without thinking, observing, checking, or reading instructions or labels.
  - When people assume that they know how something should be operated, they often make faulty judgments that lead to errors. In some product use situations, alertness is vital to safe performance.

Woodson et al. provide the following design considerations that should be taken into account due the above behavioral expectancies and safety implications when designing products (2):

- Anticipate possible lack of interest or overconfidence on the part of the user and design in such a way as to alert and stimulate the user to possible critical aspects of product use and operation. The design should be made as simple as possible and potential hazards should be conspicuously identified and brought to the user's attention.
- Analyze the potentially hazardous interactions between the naïve user and the various product elements to make sure that every means possible of precluding misuse has been designed into the product, that misuse has been warned against, and/or that the potential severity of the hazard has been minimized.

People's perceptions of the hazards associated with a product are also affected by the presence or absence of a warning, the perceived severity of consequences, and the source of the product information. For example:

- People expect hazardous products to contain warnings that are presented proximate to the product (10);
- People are more likely to look for and read warnings for products they perceive as hazardous (10); and
- People are more likely to take precautions when they believe a product hazard can result in severe injury (25).

Frequently, consumer's knowledge of a product's hazards is incomplete especially for non-open or non-obvious hazards (2,3,16,17,26). Furthermore, users may have knowledge of some hazards associated with a product but not others or they may require a cue (e.g., a warning) to recognize a particular hazard (2,3,16,17,26). Research has also shown that people do not think about unknown or unexpected hazards in familiar situations (2,3,16,17,26). The result is that people who do not expect a hazard to exist will not actively look for one (2,17). Furthermore,

people who are not aware of a hazard do not realize that they are putting themselves at risk and do not knowingly take steps to avoid the unknown hazard (2,16,17,26).

Ursy testified that she would clean the lint screen before each load and that occasionally she would clean the interior of the dryer drum and the top of the dryer cabinet (UV, 20-22,24). Ursy would also sweep and use a dust-buster to clean up any visible dust around the dryer (UV, 24,25).

Joseph Vitale testified that he moved the dryer from the wall at least once a year to disconnect the duct work, clean it, and make sure the transition duct was in good shape (JV, 8,15). Joseph also testified that he would clean behind the dryer when he moved it out from the wall (JV, 11). Joseph would also check to ensure the flexible foil transition duct was not leaking any air after re-attaching it to the dryer (JV, 15). Joseph had also replaced and upgraded the permanent wall duct and vent hood about a year before the fire to make sure it was in good condition (JV, 12-15).

The Vitales were not aware of any problems with the dryer prior to the fire and never had a technician come out to repair the dryer (JV, 15,16; UV, 20,25). Ursy testified that she never found that the clothes were not drying quick enough or found any kinds of holes or damage in the clothes after they came out of the dryer (UV, 20).

Ursy Vitale testified that she was not aware that this type of dryer allows lint to collect in areas that are not visible to the user and near the heat source where it creates a fire hazard (UV, 41). The Vitales were not aware that Electrolux recommended not using flexible foil ducting. On the contrary, the flexible foil transition duct used to exhaust the dryer, which was installed prior to the Vitales moving into the home, possesses a product label identifying it as a "GE UL Listed, Clothes Dryer Transition Duct."

The Vitales' actions are also consistent with the warning provided on the inside door frame of the dryer (e.g., Ursy cleaned the lint screen each time she used the dryer, the dryer was exhausted outdoors, Jospeh checked the airflow and ensured the vent hood was clear). However, the Vitales' actions are also consistent with an incomplete understanding of where lint buildup can occur (i.e., near the heat source behind the drum). The Vitales' actions and beliefs are also consistent with a user having incomplete knowledge of the hazards associated with a product and a manufacturer's failure to provide adequate warning to fill in and complete that knowledge.

The Vitales' actions and beliefs are also consistent with the general consumer population. For example, the National Fire Protection Associates (NFPA) has reported that in 2006 there were an estimated 16,284 residential fires in the United States involving clothes dryers (27). In 2012, the U.S. Fire Administration (USFA) reported an average of 2,900 clothes dryer fires in the US from 2008 to 2010 (28). The NFPA reported that lack of dryer maintenance was the leading cause of clothes dryer fires and that the first material ignited in 30% and 27% of the clothes dryer fires was "clothing" and "dust, fiber, or lint," respectively (27). The USFA reported the

leading specific factor contributing to the ignition of clothes dryer fires was failure to clean (34% of fires) (28).

The Consumer Product Safety Commission (CPSC) has reported similar estimates of residential clothes dryer fires for the 1998 and 1999 time periods (29,30). In a 2010 survey, the CPSC found that over 51% of the respondents used flexible foil ducting in their dryer exhaust system; over 80% cleaned their lint screen at least once after every other load; about 71% checked their exhaust exits; and 62% cleaned the area under the lint filter (31). However, only 38% cleaned the dryer ducts and 20% cleaned inside the dryer cabinet once within the last 5 years (30). Six percent of the consumer who reported cleaning the inside of the dryer and 13% who reported cleaning the duct, did so because a repair was being performed on the dryer (31). The CPSC notes that their survey is based upon a convenience sample and therefore (31):

> ...because voluntary registration via the CPSC website is the only method by which consumers can participate in the survey, the staff believes that this respondent population is more likely to show an interest in product safety and to be more aware of safety issues than the general public. Unsafe behaviors or low hazard perceptions among this population would most likely point to problems that would be even more prevalent among the general consumer population.

Based upon the CPSC survey data, contrary to being negligent in their actions, Emil and Sharon Cloud's dryer maintenance practices were consistent with the majority of dryer users.

The Vitales' actions and beliefs are also consistent with those of Electrolux employees and their customers. For example, Brian Ripley, staff engineer responsible for the design of Electrolux Alliance series dryers, testified that before he started working for Electrolux he installed a GE dryer in his own home using flexible plastic duct (BR 7/18/13: 172,173). Ripley also testified that he did not read the exhaust installation section of the manual for the GE dryer and used the flexible plastic duct because the retailer recommended it (BR 7/18/13: 173). Ripley also testified that he was not aware that lint could accumulate in the dryer cabinet until the 1995/1996 time frame, even though he started working at Electrolux in dryer design in 1988 (BR 6/22/11: 188; BR 6/1/12: 25). Ripley also testified that it was NOT common knowledge at Electrolux that lint can accumulate in the dryer cabinet (BR 6/22/11: 187). Ripley also testified that he has never had someone come out and clean his dryer after 18 months of use (BR 6/22/11: 204,205).

David Fuller was the Electrolux quality engineer assigned to dryers from about 1999 to 2011 (DF, 127,154). Fuller testified that although he cleaned his dryer once a year, he did disassemble the dryer, remove drum, or clean the lint build up within the heater pan to prevent lint from building up near the heat source (DF, 135,136,161,175). Fuller testified that he was not aware that lint could build up in the heater pan (DF, 60,161). Fuller also testified that he was not aware that the yearly cleaning requirement was recommended to prevent lint building near the heat source where it could be ignited and cause a fire (DF, 174,175).

Shelly Clausen worked as the Engineering Service Manager for over ten years at Electrolux (SC, 4). Clausen's group had input into the end user literature and warnings that accompanied their dryers (SC, 4,5,10,11,13). Clausen testified that she has never had her dryer professionally serviced or called an authorized servicer to clean her dryer (SC, 129,132). Clausen also testified she has only cleaned her external dryer vent once over the last ten years (SC, 129,130). When asked why she never removed the drum and vacuumed behind it, Clausen testified "Why would I have done that?" (SC, 131). Clausen also testified that as a consumer she does not know that she would have ever thought about the need to remove the drum and vacuum behind it (SC, 131,132). Clausen also testified that because her dryer seems to be working well it never occurred to her that the dryer could contain a possible fire hazard (SC, 133).

Steve Joerger joined Electrolux in 2004 as a product manager for dryers and in 2009 became the Director of Quality (SJ, 8-10,82). Joerger testified that as Director of Quality at Electrolux he was not aware that lint could accumulate behind the dryer drum or the heater pan in sufficient quantities to create a fire hazard and that had he known he would have issued a service bulletin to address the problem (SJ, 82,95,96). Joerger also testified that to his knowledge Electrolux phone technicians were not instructed to inform consumers to clean the lint from inside of the dryer cabinet (SJ, 99,100).

The Vitales' actions and beliefs are not only consistent with Electrolux's lead dryer engineer, quality engineer, manual writer, and quality director but also with the majority of Electrolux's dryer users. For example, as of November 2000, Electrolux's service department was aware that most people were using an improper type of flexible transition duct to exhaust their dryer. Currently on their Venting Kit web page store, Electrolux notes that[7]:

> Clean the inside of the dryer, and around its heating element. Most people don't know that lint can build up around the heating element and cause a fire.

Carl King testified that in his investigation of more than 600 dryer fires, flexible foil is the most common type of duct he sees used (CDK 7/18/13: 35,41-44). King also testified that during his fire investigations he very often finds the interior of the dryer was not professionally cleaned every 18 months (CDK 7/18/13: 65)

Without adequate warning to the contrary, Joseph and Ursy Vitale's lack of knowledge with respect to the need to have the dryer cleaned every year and the prohibition of using flexible foil ducting was foreseeable to Electrolux.

Electrolux knew or should have known that user's (such as Joseph and Ursy Vitale) knowledge did not extend to the fire hazard associated with the use of flexible foil ducting and not having the interior of the dryer and house exhaust system cleaned yearly by an Electrolux authorized service technician.

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[7] Last downloaded 6/4/14: http://www.electrolux-store.com/electrolux-venting-kit.html

As with product users in general, Joseph and Ursy Vitale relied upon Electrolux to provide them with a reasonably safe product and adequate warning to understand how to safely use the incident dryer.

F. FINDINGS

Within the bounds of reasonable scientific certainty, and subject to change if additional information becomes available, it is my professional opinion that:

1. Electrolux's yearly cleaning and exhaust duct recommendations failed to comply with the standard of care for the design and development of product safety warnings used to communicate critical safety information to product users and installers.
2. Electrolux was aware that installers and users of their dryers were not reading the written material they provided with the dryer, were only reading parts of the accompanying material, and/or did not have the material available when installation and/or using the dryer.
3. It was not reasonable for Electrolux to rely solely upon the use of manuals and a checklist to warn installers and users that the incident dryer needed to be cleaned at least once a year, that flexible foil venting should not be used, and that lint buildup near the heat source and a fire can result if these instructions are not followed.
4. Electrolux should have conspicuously and permanently placed the warnings directly on the dryer and the dryer was defective and unreasonably dangerous without them.
5. Electrolux failed to provide effective warnings in their manuals regarding the lint fire hazard, the prohibition from using flexible foil ducting, and the requirement to have the interior of the dryer and exhaust cleaned every year.
6. Electrolux should have provided prominently placed, conspicuous, legible, explicit and specific warnings in their dryer manuals and the dryer was defective and unreasonably dangerous without them.
7. Electrolux failed to provide an adequate warning system, which included conspicuous and explicit on-product warnings, which met contemporary industry standards, guidelines, and practices regarding the lint fire hazard associated with the improper maintenance and installation of the dryer.
8. Electrolux's failure to provide an adequate warning system regarding the lint buildup fire hazard, which included the use of conspicuous and explicit on-product warnings, was unreasonably dangerous, rendered the GE dryer defective and unreasonably dangerous, needlessly placed consumers and product users in danger, and caused the fire.
9. Electrolux's failure to provide an adequate warning system regarding the lint buildup fire hazard deprived Joseph and Ursy Vitale of critical safety information they needed to safely use the dryer.
10. Electrolux's failure to comply with long known applicable guidelines, practices, and the American National Standard Z535.4 deprived Joseph and Ursy Vitale of the protection afforded to the public by those guidelines and standards.

11. Electrolux's failure to assess the efficacy of their warnings and instructions was improper, unreasonably dangerous, contrary to common industry practices, and was a cause of the fire.
12. Electrolux's failure to exercise reasonable diligence in the use of their service, warranty, and claims data to assess and improve the effectiveness of their product warnings was unreasonably dangerous, improper, and a cause of the fire.
13. Because alternative safeguards were available to mitigate the fire hazard associated with lint buildup within the dryer, the only adequate warning system that Electrolux could have provided was in conjunction with one or both of the safeguards.
14. In conjunction with the indicator light(s), Electrolux should have ensured conspicuous, specific, and explicit on-product warnings were provided on their Frigidaire ball-hitch style free standing dryers, including the incident dryer.
15. The warnings should have been placed on top of the dryer and the back of the dryer, where relevant (see below), and repeated within the manuals, checklist, and operating instructions for the dryer.
16. If Electrolux chose not to provide the available safeguard(s) and associated indicator light(s), the very least they should have done was provided a conspicuous warning attached to the top or front of their dryer informing users of the yearly cleaning requirement.
17. It would have been reasonable for Electrolux to provide an adequate warning system, including two conspicuous, specific, and explicit on-product warnings, with their GE branded dryer. The cost in terms of money, effort, and time to do so would have been minimal and insignificant.
18. Had an adequate warning system, including two conspicuous, explicit, and specific on-product warnings, been provided, Electrolux would have ensured that Joseph and Ursy Vitale were provided with the information they needed to make an informed decision as to their use and maintenance of the incident dryer and avoided the fire.
19. Without adequate warning to the contrary, Joseph and Ursy Vitale's lack of knowledge with respect to the need to have the dryer cleaned every year and the prohibition of using flexible foil ducting was foreseeable to Electrolux.
20. Electrolux knew or should have known that user's (such as Joseph and Ursy Vitale) knowledge did not extend to the fire hazard associated with the use of flexible foil ducting and not having the interior of the dryer and house exhaust system cleaned yearly by an Electrolux authorized service technician.
21. As with product users in general, Joseph and Ursy Vitale relied upon Electrolux to provide them with a reasonably safe product and adequate warning to understand how to safely use the incident dryer.

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H. APPENDIX